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## I

(Acts whose publication is obligatory)

**DECISION No 1513/2002/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL  
of 27 June 2002**

**concerning the sixth framework programme of the European Community for research, technological development and demonstration activities, contributing to the creation of the European Research Area and to innovation (2002 to 2006)**

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 166(1) thereof,

Having regard to the proposal from the Commission <sup>(1)</sup>,

Having regard to the opinion of the Economic and Social Committee <sup>(2)</sup>,

Having regard to the opinion of the Committee of the Regions <sup>(3)</sup>,

Acting in accordance with the procedure laid down in Article 251 of the Treaty <sup>(4)</sup>,

Whereas:

(1) For the fulfilment of the tasks laid down in Article 2 of the Treaty, Article 163 of the Treaty provides that the Community is to have the objective of strengthening the scientific and technological bases of Community industry and encouraging it to become more competitive at international level, while promoting research activities deemed necessary by virtue of other Community policies.

(2) Article 164 of the Treaty enumerates the activities the Community is to carry out in pursuing these objectives, complementing the activities carried out in the Member States.

(3) The Treaty provides for the adoption of a multiannual framework programme setting out all Community research, technological development and demonstration (RTD) activities. This framework programme fully respects the principle of subsidiarity as set out in Article 5 of the Treaty.

(4) Pursuant to Article 165 of the Treaty, the Community and Member States are to coordinate their research and technological development activities so as to ensure that national policies and Community policy are mutually consistent.

(5) In 2000 the Commission submitted two communications, respectively on the prospects for and the objectives of creating a European Research Area, and on making a reality of the European Research Area and guidelines for European Union research activities in the period 2002 to 2006. In 2000 the Commission also submitted a communication on innovation in a knowledge-driven economy.

(6) The European Councils in Lisbon in March 2000, Santa Maria de Feira in June 2000 and Stockholm in March 2001 adopted conclusions aimed at the rapid establishment of a European research and innovation area with a view to sustainable economic growth, more employment and social cohesion with the ultimate goal of enabling the Union, by 2010, to become the world's most competitive and dynamic knowledge economy.

Building upon the obligation of Article 6 of the Treaty, the Göteborg European Council in June 2001 agreed on a strategy for sustainable development and added a third, environmental dimension to the Lisbon strategy.

In particular, the European Council in Lisbon underlined the importance of the Commission's e-Europe initiative, which aims at an information society for all, while the Stockholm European Council also stressed the need to make particular efforts in new technologies, especially biotechnology.

<sup>(1)</sup> OJ C 180 E, 26.6.2001, p. 156 and OJ C 75 E, 26.3.2002, p. 132.

<sup>(2)</sup> OJ C 260, 17.9.2001, p. 3.

<sup>(3)</sup> OJ C 107, 3.5.2002, p. 111.

<sup>(4)</sup> Opinion of the European Parliament of 14 November 2001 (not yet published in the Official Journal), Council Common Position of 28 January 2002 (OJ C 113 E, 14.5.2002, p. 54) and Decision of the European Parliament of 15 May 2002 (not yet published in the Official Journal). Council Decision of 3 June 2002.

- (7) The European Parliament <sup>(1)</sup> <sup>(2)</sup>, the Council <sup>(3)</sup> <sup>(4)</sup>, the Economic and Social Committee <sup>(5)</sup> and the Committee of the Regions <sup>(6)</sup> have also supported the creation of the European Research Area.
- (8) On 19 October 2000 the Commission submitted the conclusions of the external assessment of the implementation and results of the Community activities carried out in the five years preceding that assessment, accompanied by its observations.
- (9) The sixth framework programme should have a structuring effect on research and technological development in Europe, including the Member States, associated candidate countries and other associated countries and make a significant contribution to the establishment of the European Research Area and to innovation.
- (10) In accordance with Article 166(1) of the Treaty, it is necessary to establish the scientific and technological objectives and to fix the relevant priorities for the activities envisaged, the maximum overall amount, the detailed rules for Community financial participation in the sixth framework programme, as well as the respective shares in each of the activities envisaged, and to indicate the broad lines of the activities in question, which will be implemented in compliance with the objective of protecting the Community's financial interests. It is important to ensure sound financial management of the sixth framework programme.
- (11) It is appropriate to place special emphasis on the needs of small and medium-sized enterprises (SMEs), bearing in mind the European Charter for Small Enterprises endorsed by the Feira European Council, whose principles and eighth line for action aim to strengthen the technological capacity of small enterprises, and to facilitate access to the best research and technology.
- (12) The sixth framework programme should provide an important contribution, covering the full spectrum from basic to applied research, to the development of scientific and technical excellence and to the coordination of European research. The framework programme should stress the importance of involving associated candidate countries in the Community's research policy and in the European Research Area.
- (13) Specific targeted projects and coordination actions may also be used as a 'stairway of excellence' to facilitate the access of smaller research actors of scientific excellence, including SMEs, as well as research actors from associated candidate countries, to the activities of this framework programme.
- (14) The participation of the outermost regions in Community RTD actions through appropriate mechanisms adapted to their particular situation should be facilitated.
- (15) The international and global dimension in European research activities is important in the interest of obtaining mutual benefits. The sixth framework programme is open to the participation of countries having concluded the necessary agreements to this effect, and is also open on the project level, and on the basis of mutual benefit, to the participation of entities from third countries and of international organisations for scientific cooperation. Specific activities will be undertaken in support of participation of scientists and institutions from developing countries, Mediterranean countries including the western Balkans as well as Russia and the new independent states (NIS).
- (16) The Joint Research Centre should contribute to the implementation of the framework programme, where it can provide independent, customer-driven support for the formulation and implementation of Community policies, including the monitoring of implementation of such policies, in the areas of its specific competence.
- (17) Research activities carried out within the sixth framework programme should respect fundamental ethical principles, including those which are reflected in Article 6 of the Treaty on European Union and in the Charter of fundamental rights of the European Union.
- (18) Following the Commission communication 'A mobility strategy within the European Research Area', the mobility of researchers will be promoted, with a view to the successful creation of the European Research Area.
- (19) Following the Commission communication 'Women and Science' and the Resolutions of the Council of 20 May 1999 <sup>(7)</sup> and 26 June 2001 <sup>(8)</sup> and the Resolution of the European Parliament of 3 February 2000 <sup>(9)</sup> on this

<sup>(1)</sup> Resolution of 18 May 2000 (OJ C 59, 23.2.2001, p. 250).

<sup>(2)</sup> Resolution of 15 February 2001 (OJ C 276, 1.10.2002, p. 271).

<sup>(3)</sup> Resolution of 15 June 2000 (OJ C 205, 19.7.2000, p. 1).

<sup>(4)</sup> Resolution of 16 November 2000 (OJ C 374, 28.12.2000, p. 1).

<sup>(5)</sup> Opinion of 24 May 2000 (OJ C 204, 18.7.2000, p. 70).

<sup>(6)</sup> Opinion of 12 April 2000 (OJ C 226, 8.8.2000, p. 18).

<sup>(7)</sup> OJ C 201, 16.7.1999, p. 1.

<sup>(8)</sup> OJ C 199, 14.7.2001, p. 1.

<sup>(9)</sup> OJ C 309, 27.10.2000, p. 57.

theme, an action plan is being implemented in order to reinforce and increase the place and role of women in science and research, and further enhanced action is needed.

- (20) The Commission should submit regular progress reports to the European Parliament and the Council on the implementation of the sixth framework programme. It is also appropriate that the Commission, in good time and before submitting its proposal for the seventh framework programme, has an independent assessment carried out of the implementation of the activities undertaken, bearing in mind the contribution of the sixth framework programme to the creation of the European Research Area, which should be done in a spirit of openness with respect to all the relevant actors.
- (21) Implementation of the sixth framework programme may give rise to the participation of the Community in programmes undertaken by several Member States or to the setting up of joint undertakings or other arrangements within the meaning of Articles 169 to 171 of the Treaty.
- (22) The Scientific and Technical Research Committee (CREST) has been consulted,

HAVE DECIDED AS FOLLOWS:

#### *Article 1*

1. A multiannual framework programme for Community research, technological development and demonstration activities, hereinafter referred to as the 'sixth framework programme' is hereby adopted for the period 2002 to 2006.
2. The sixth framework programme shall comprise all Community activities envisaged in Article 164 of the Treaty.
3. The sixth framework programme shall contribute to the creation of the European Research Area and to innovation.
4. Annex I sets out the scientific and technological objectives and the related priorities and indicates the broad lines of the activities envisaged.

#### *Article 2*

1. The maximum overall amount for Community financial participation in the entire sixth framework programme shall be EUR 16 270 million. The proportion assigned to each of the activities is fixed in Annex II.

2. The detailed rules for financial participation by the Community shall be governed by the Financial Regulation applicable to the General Budget of the European Communities, supplemented by Annex III.

#### *Article 3*

All the research activities carried out under the sixth framework programme must be carried out in compliance with fundamental ethical principles.

#### *Article 4*

In the context of the annual report to be submitted by the Commission pursuant to Article 173 of the Treaty, the Commission shall report in detail on progress with implementing the sixth framework programme, and in particular progress towards achieving its objectives and meeting its priorities as set out under each heading of Annex I; information on financial aspects and the use of the instruments shall also be included.

#### *Article 5*

The sixth framework programme shall be implemented through specific programmes. These programmes shall establish precise objectives and the detailed rules for implementation.

#### *Article 6*

1. The Commission shall continually and systematically monitor, with the help of independent qualified experts, the implementation of the sixth framework programme and its specific programmes.
2. Before submitting its proposal for the next framework programme, the Commission shall have an external assessment carried out by independent highly qualified experts of the implementation and achievements of Community activities during the five years preceding that assessment.

The Commission shall communicate the conclusions thereof, accompanied by its observations, to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions.

Done at Luxembourg, 27 June 2002.

*For the European Parliament*

P. COX

*The President*

*For the Council*

M. ARIAS CAÑETE

*The President*

## ANNEX I

**SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES, BROAD LINES OF THE ACTIVITIES AND PRIORITIES**

## INTRODUCTION AND GENERAL OUTLINE

The sixth framework programme ('this programme') will be carried out to further the objective set out in Article 163(1) of the Treaty, 'of strengthening the scientific and technological bases of Community industry and encouraging it to become more competitive at international level, while promoting all the research activities deemed necessary by virtue of other Chapters of this Treaty'.

In order to achieve this more effectively, and in order to contribute to the creation of the European Research Area and to innovation, this programme will be structured around the following three headings, under which the four activities as set out in Article 164 of the Treaty will be undertaken:

- focusing and integrating Community research,
- structuring the European Research Area,
- strengthening the foundations of the European Research Area.

The activities under these three headings will contribute to the integration of research efforts and activities on a European scale as well as contributing to the structuring of the various dimensions of the European Research Area. Coordination of activities carried out under these headings will be ensured.

In order to help the development of SMEs in the knowledge society and the use of the economic potential of SMEs in an enlarged and better integrated European Union, SMEs, including small and micro enterprises as well as craft enterprises, will be encouraged to participate in all areas and all instruments as set out in Annex III of the sixth framework programme, in particular in the context of the activities carried out in the priority thematic areas in the spirit of 'stairway of excellence'. A smooth transition from the modalities used in the fifth framework programme to those used in the sixth framework programme will be ensured.

International participation in these activities will be assured. Participation will be open to all countries having concluded association agreements with the Community to this effect. Other third countries may participate in this programme via bilateral cooperation agreements.

Researchers and organisations from third countries may also participate on a case by case basis in projects. The detailed conditions under which entities from third countries and international organisations involved in research activities may participate in this programme, including the financial arrangements, are specified in the decision which will be adopted pursuant to Article 167 of the Treaty.

Participation in the activities of this programme will be encouraged through publication of the necessary information on content, conditions and procedures, to be made available in a timely and thorough manner to potential participants, including those from the associated candidate and other associated countries.

During the implementation of this programme and in the research activities arising from it, fundamental ethical principles including animal welfare requirements, are to be respected. These include, *inter alia*, principles reflected in the Charter of fundamental rights of the European Union, protection of human dignity and human life, protection of personal data and privacy as well as the environment in accordance with Community law and, where relevant, international conventions, such as the Declaration of Helsinki, the Council of Europe Convention on Human Rights and Biomedicine signed in Oviedo on 4 April 1997 and the Additional Protocol on the Prohibition of Cloning Human Beings signed in Paris on 12 January 1998, the UN Convention on the Rights of the Child, the Universal Declaration on the Human Genome and Human Rights adopted by UNESCO, and the relevant World Health Organisation (WHO) resolutions, the Amsterdam Protocol on Animal Protection and Welfare; and current legislation, regulations and ethical guidelines in countries where the research will be carried out.

## 1. FOCUSING AND INTEGRATING COMMUNITY RESEARCH

The activities carried out under this heading, which will represent the major part of the efforts deployed under this programme, are intended to integrate research efforts and activities on a European scale. They will be focussed primarily on seven clearly defined thematic priority areas, while further specific measures will be undertaken across a wider field of scientific and technological research.

The Joint Research Centre (JRC) will provide independent customer-driven support for the formulation and implementation of Community policies, including the monitoring of implementation of such policies, within its areas of specific competence.

### 1.1. Thematic priorities

Seven priority thematic areas are identified, namely:

1. life sciences, genomics and biotechnology for health;
2. information society technologies;
3. nanotechnologies and nanosciences, knowledge-based multifunctional materials, and new production processes and devices;
4. aeronautics and space;
5. food quality and safety;
6. sustainable development, global change and ecosystems;
7. citizens and governance in a knowledge-based society.

### 1.2. Specific activities covering a wider field of research

#### 1.2.1. *Supporting policies and anticipating scientific and technological needs*

Activities in support of Community policies and research responding to new and emerging scientific and technological needs

#### 1.2.2. *Horizontal research activities involving SMEs*

These specific activities are intended to help European SMEs in traditional or new areas to boost their technological capacities and develop their ability to operate on a European and international scale.

#### 1.2.3. *Specific measures in support of international cooperation*

In support of external relations and the development policy of the Community, specific measures aimed at encouraging international research cooperation will be undertaken. In principle, the following three groups of third countries will be involved:

- (a) developing countries;
- (b) Mediterranean countries, including the western Balkans;
- (c) Russia and the new independent states (NIS).

### 1.3. Non-nuclear activities of the Joint Research Centre

Two specific research areas have been selected for JRC activities, namely:

- (a) food, chemical products and health;
- (b) environment and sustainability.

## 2. STRUCTURING THE EUROPEAN RESEARCH AREA

Activities in this area will cover the following:

### 2.1. Research and innovation

Activities to stimulate technological innovation, utilisation of research results, transfer of knowledge and technologies and the setting up of technology businesses in the Community and in all its regions will be carried out under this heading to complement the activities relating to innovation under the heading 'focusing and integrating community research'.

### 2.2. Human resources and mobility

Activities to support the development of world-class human resources in all the regions of the Community by promoting transnational mobility for training purposes, development of expertise or transfer of knowledge between different sectors, supporting the development of excellence and helping to make Europe more attractive to the best of third country researchers. The potential offered by all sectors of the population, especially women, should be developed through appropriate supporting measures.

### 2.3. Research infrastructures

Activities to promote the optimum use of, including access to, research infrastructures and to support the identification, planning and, in duly justified cases, setting up of advanced research facilities of European interest.

### 2.4. Science and society

Activities to encourage harmonious relations between science and society and the awareness of society in respect of innovation, as a result of new relations and informed dialogue between researchers, industrialists, political decision-makers and citizens.

## 3. STRENGTHENING THE FOUNDATIONS OF THE EUROPEAN RESEARCH AREA

Activities to step up the coordination and support the coherent development of research and development policies in Europe. They would provide financial support for measures such as the opening up of national programmes.

A more detailed description of the activities carried out under these three headings is set out below.

### I. FOCUSING AND INTEGRATING COMMUNITY RESEARCH

The activities carried out under this heading will represent the major part of the research efforts deployed under this programme, intended to contribute to the general objective of the Treaty of strengthening the scientific and technical bases of Community industry and encouraging it to be more competitive at international level, while promoting all the research activities deemed necessary by other Chapters of the Treaty. In order to bring about European added value by assembling a critical mass of resources, this programme will focus on seven, clearly defined thematic priority areas where Community research efforts will be integrated by pulling them together and making them more coherent, on a European scale.

Throughout the activities under this heading, special attention will be given to technological innovation, and to the initial development of highly innovative enterprises in areas of vital interest to the European competitiveness. Exploratory research at the leading edge of knowledge will be carried out on subjects closely related to one or more topics in the thematic priority. Measurements and testing aspects will also receive necessary emphasis. The principle of sustainable development, socio-economic, ethical and wider cultural aspects of the envisaged activities, and gender equality, will be duly taken into account, where relevant for the activity concerned.

To complement efforts in the thematic priorities, specific horizontal research activities will address SMEs, innovation and international cooperation as well as respond to Community policy objectives and future and emerging research needs.

## 1.1. Thematic priorities

### 1.1.1. *Life sciences, genomics and biotechnology for health* <sup>(1)</sup>

#### Objective

The activities carried out in this area are intended to help Europe exploit, by means of an integrated research effort, breakthroughs achieved in decoding the genomes of living organisms, more particularly for the benefit of public health and citizens and to increase the competitiveness of the European biotechnology industry. In the field of applications, the emphasis will be put on research aimed at bringing basic knowledge through to the application stage ('translational' approach) to enable real, consistent and coordinated progress at European level in medicine and improve the quality of life.

#### Justification of the effort and European added value

'Post-genomic' research based on analysis of the human genome and genomes of other organisms, will culminate in numerous applications in various health-related sectors, and notably in the development of new diagnostic tools and new treatments capable of helping to combat diseases that are not at present under control, offering major potential markets. This research may also have implications on research on areas such as environment and agriculture.

In the medical field, the objective is to develop improved patient-oriented strategies for the prevention and management of disease and for living and ageing healthily. Furthermore, in this context, attention will be paid to childhood diseases and related treatments whenever appropriate. In addition, there is a particular priority for Europe to mobilise its efforts in a coordinated way towards combating cancer and confronting the major communicable diseases linked to poverty. This research will therefore concentrate on translating the new knowledge being created, which is not limited to genomics and other fields of basic research, into applications that improve clinical practice and public health.

To enable the Union to improve its position in this area and benefit fully from the economic and social spin-offs of the expected developments, as well as contribute to the international debate, it is necessary both to increase investment significantly and integrate the research activities conducted in Europe within a coherent effort.

#### Actions envisaged

The Community activities carried out to this end will address the following aspects.

#### A. *Advanced genomics and its applications for health*

##### (a) Fundamental knowledge and basic tools for functional genomics in all organisms:

- (i) gene expression and proteomics;
- (ii) structural genomics;
- (iii) comparative genomics and population genetics;
- (iv) bio-informatics;
- (v) multi-disciplinary functional genomics approaches to basic biological processes.

<sup>(1)</sup> Fundamental knowledge in genomics (including human/animal/plant) is covered by the first priority, as well as its applications to human health. Applications to food are covered by the fifth priority (for example relating to nutrition/better quality food). Other issues related to life sciences are addressed under the sixth priority or covered, as appropriate, by Section 1.2.1. ('Policy oriented research') as well as Heading III.



- (b) Application of knowledge and technologies in the field of genomics and biotechnology for health:
  - (i) technological platforms for the developments in the fields of new diagnostic, prevention and therapeutic tools (including pharmacogenomic approaches, stem cell research and alternative methods to animal testing).

*B. Combating major diseases*

- (a) Application-orientated approach to medical genomics knowledge and technologies including the use of animal and plant genomics where relevant, mainly in the following fields <sup>(1)</sup>:
  - (i) combating diabetes, diseases of the nervous system (such as Alzheimer's disease, Parkinson's disease and new variant Creutzfeldt-Jakob disease and, where relevant, mental illness), cardiovascular diseases, and rare diseases;
  - (ii) combating resistance to antibiotics and other drugs;
  - (iii) studying human development, the brain and the ageing process.
- (b) A broader approach, not limited to genomics and other fields of basic research, will be pursued with regard to:
  - (i) cancer, with a focus on the development of patient-oriented strategies from prevention to diagnosis and treatment, including three inter-linked components:
    - developing necessary networks and initiatives to coordinate national research activities,
    - supporting clinical research aimed at validating new and improved interventions,
    - supporting 'translational' research;
  - (ii) combating the three poverty-linked infectious diseases (AIDS, malaria and tuberculosis) which have priority in terms of disease control at Union and international level.

**1.1.2. Information society technologies (IST)**

**Objective**

The activities carried out in this area, pursuant to the conclusions of the Lisbon European Council and the objectives of the *e-Europe* initiative, are intended to stimulate the development in Europe of both hardware and software technologies and applications at the heart of the creation of the information society in order to increase the competitiveness of European industry and allow European citizens in all Union regions the possibility of benefiting fully from the development of the knowledge-based society. Concentration on the future generation of IST will bring IST applications and services to everyone and enable the development of the next generation of technologies to be more user-centered.

**Justification of the effort and European added value**

At the dawn of the 21st century, information and communication technologies are revolutionising the functioning of the economy and society, and are generating new ways of producing, trading and communicating.

This has become the Union's second most important sector of the economy, with an annual market of EUR 2 000 billion and employing more than 2 million persons in Europe, a number that is steadily rising.

Europe is well positioned to lead and shape the future development not only of technologies but also of their impact on our life and work. The future competitiveness of all European industry and the living standards of

<sup>(1)</sup> See also Section 1.2.1. 'Policy support and anticipating scientific and technological needs' and Heading III (Strengthening the foundations of the European Research Area) for other health-related topics.

Europe's citizens depend largely on future efforts in IST research in order to prepare the future generation of products, processes and services.

Industrial and commercial successes of the kind that Europe has achieved in mobile communications as a result of the global system for mobile communication (GSM) standard will not be repeated unless a concerted effort is made to invest a critical mass of research resources in this area, by integrating public and private sector efforts on a European scale.

With a view to exerting maximum impact in economic and social terms, effort should focus on the future generation of those technologies in which computers, interfaces and networks will be more integrated into the everyday environment and will render accessible, through easy and 'natural' interactions, a multitude of services and applications. This vision of 'ambient intelligence' (interactive intelligent environment) seeks to place the user, the human being, at the centre of the future development of the knowledge-based society.

Community actions will concentrate on the technological priorities that will make it possible to realise this vision. They will aim at mobilising the community of researchers around targeted initiatives, such as the development of the next generations of mobile communication systems, so as to achieve medium and long-term objectives while being able to react to the new needs and demands of markets as well as those of public policy and citizens.

#### Actions envisaged

The actions undertaken will therefore address the following technological priorities:

##### *Integrating research into technological areas of priority interest for citizens and businesses*

Completing and building on progress expected in the development of basic technologies, research aimed at finding solutions for major societal and economic challenges, faced by an emerging knowledge-based society including the consequences for work and the workplace environment, and, accordingly, focusing on:

- (a) research on technologies addressing the key security challenges posed by the 'all-digital' world and the need to secure the rights and privacy of citizens;
- (b) 'ambient intelligence' systems offering access to the information society for all, regardless of age and situation (such as disability or other individual circumstances), as well as interactive and intelligent systems for health, mobility, security, leisure, tourism, access to and preservation of the cultural heritage, and environment;
- (c) electronic and mobile commerce, as well as technologies for secure transactions and infrastructures, new tools and new methods of work, technologies for learning (such as e-learning) and systems for corporate knowledge management, for integrated business management and for e-government taking account of user needs;
- (d) large-scale distributed systems and platforms, including global resource information database (GRID) based systems that provide effective solutions to complex problems in areas such as the environment, energy, health, transport and industrial design.

##### *Communication and computing infrastructures*

Mobile, wireless, optical and broadband communication infrastructures and computing and software technologies that are reliable, of wide application and can be adapted to meet the growing needs of applications and services. Work will focus on:

- (a) the new generations of wireless and mobile communications systems and networks; satellite communications systems; all-optical technologies; integration and management of communication networks, including interoperable network solutions; capacity-enhancing technologies necessary for the development of systems, infrastructures and services, in particular for audio-visual applications. Work will also lead to the development of next Internet generation;

- (b) software technologies architectures, distributed and embedded systems supporting the development of multifunctional and complex services that involve multiple actors engineering and control of complex and large-scale systems to ensure reliability and robustness.

#### *Components and microsystems*

Miniaturised and low-cost components based on new materials and integrating extended functionalities, with the effort focusing on:

- (a) the design and production of nano-, micro-, and opto-electronic and photonic components, including those used for information storage, pushing the limits of miniaturisation and minimising the costs and power consumption of micro-electronic and micro-system components, and taking account of the environmental impact of IST systems;
- (b) nano-electronics, micro-technologies, displays and micro-systems, and multi-disciplinary research into new materials and quantum devices; new computing models and concepts.

#### *Information management and interfaces*

Research into information management tools and interfaces, with a view to enabling easier interaction everywhere and at all times with knowledge-based services and applications, addressing:

- (a) knowledge representation and management systems based on context and semantics, including cognitive systems, as well as tools for creating, organising, navigating, retrieving, sharing, preserving and disseminating digital content;
- (b) multi-sensorial interfaces capable of understanding and interpreting the natural expression of human beings through words, gestures and the various senses, virtual environments, as well as multilingualistic and multicultural systems indispensable to the establishment of the knowledge-based society on a European scale.

### **1.1.3. *Nanotechnologies and nanosciences, knowledge-based multifunctional materials and new production processes and devices***

#### **Objective**

The activities carried out in this area are intended to help Europe achieve a critical mass of capacities needed to develop and exploit, especially for greater eco-efficiency and reduction of discharges of hazardous substances to the environment, leading-edge technologies for the knowledge-based products, services and manufacturing processes of the years to come.

#### **Justification of the effort and European added value**

Manufacturing industry in Europe at present produces goods and services valued at around EUR 4 000 billion a year. In an increasingly competitive world market, it must maintain and increase its competitiveness while meeting the requirements of sustainable development. To do so, it is necessary to put substantial effort into the design, development and dissemination of advanced technologies: nanotechnologies, knowledge-based multifunctional materials and new production processes.

Lying at the frontier of quantum engineering, materials technology and molecular biology, and one of the foreseeable hubs of the next industrial revolution, nanotechnologies need considerable investment.

Europe has significant expertise in certain sectors such as nanomanufacturing and nanochemistry, and needs to increase and coordinate its effort in this area.

Where materials are concerned, the aim is to develop intelligent materials which are expected to add considerable value in terms of applications in sectors such as transport, energy, electronics and the biomedical sector and for which there is a potential market of several tens of billions of euro.

The development of flexible, integrated and clean production systems will also require a substantial research effort concerning the application of new technologies to manufacturing and management.

#### Actions envisaged

##### *Nanotechnologies and nanosciences:*

- (a) long-term interdisciplinary research into understanding phenomena, mastering processes and developing research tools;
- (b) supramolecular architectures and macromolecules;
- (c) nano-biotechnologies;
- (d) nanometre-scale engineering techniques to create materials and components;
- (e) development of handling and control devices and instruments;
- (f) applications in areas such as health, chemistry, energy, and the environment.

##### *Knowledge-based multifunctional materials:*

- (a) development of fundamental knowledge;
- (b) technologies associated with the production and transformation including processing of knowledge-based multifunctional materials and of biomaterials;
- (c) support engineering.

##### *New production processes and devices:*

- (a) the development of new processes and flexible and intelligent manufacturing systems incorporating advances in virtual manufacturing technologies, including simulations, interactive decision-aid systems, high-precision engineering and innovative robotics;
- (b) systems research needed for sustainable waste management and hazard control in production and manufacturing, including bio-processes, leading to a reduction in consumption of primary resources and less pollution;
- (c) development of new concepts optimising the life cycle of industrial systems, products and services.

#### 1.1.4. **Aeronautics and space**

##### Objective

The aim of activities carried out in this area is two-fold: to strengthen, by integrating its research efforts, the scientific and technological bases of the European aeronautics and space industry and encouraging it to become more competitive at international level; and to help exploit the potential of European research in this sector with a view to improving safety and environmental protection.

##### Justification of the effort and European added value

The aerospace industry consists of two technologically and economically separate sectors but they are closely associated on account of their industrial and political implications and the stakeholders involved and they are examples of where Europe has a tradition of success, and economic and commercial potential.

However, United States investment in aerospace is three to six times higher, depending on the sector.

In an increasingly demanding competitive environment, foreseeable aviation requirements worldwide correspond to some 14 000 new aircraft over the next 15 years, representing a market worth EUR 1 000 billion. The efforts made to integrate industrial capacities and development activities that have brought about European successes in this area, now need to be matched by similar efforts to integrate research into priority themes and subjects.

With this aim in view, European, national and private sector research efforts should be optimised around a common vision and a strategic research agenda.

On space, following on from the Commission's communication, 'Europe and space: turning to a new chapter', the Community will support research designed to make use of space for the benefit of markets and society.

#### Actions envisaged

##### *Aeronautics*

Community aeronautical research activities including air transport systems will address research and technological development activities necessary in order to:

- (a) increase the competitiveness of the European industry with regard to civil aircraft, engines and equipment;
- (b) reduce the environmental impact of aviation, by reducing fuel consumption, CO<sub>2</sub>, NO<sub>x</sub> and other chemical pollutants and noise pollution;
- (c) increase aircraft safety in the context of the substantial rise in air traffic;
- (d) increase the capacity and safety of the air transport system, in support of a 'Single European Sky' (air traffic control and management systems).

##### *Space*

Community space activities carried out in close coordination with the European Space Agency (ESA), the other space agencies, research centres and industry, in order to strengthen the coherence of the very major investment involved, will address:

- (a) research on satellite-based information systems and services relevant for the Galileo satellite navigation project;
- (b) research on satellite-based systems relevant for the global monitoring for environment and security (GMES) platform, taking into account the needs of users;
- (c) advanced research needed to integrate the space segment and the Earth segment in the field of communications.

#### 1.1.5. **Food quality and safety**

##### Objective

The activities carried out in this area are intended to help establish the integrated scientific and technological bases needed to develop an environmentally friendly production and distribution chain of safer, healthier and varied food, including sea-food and to control food-related risks, relying in particular on biotechnology tools taking into account the results of post-genomic research, as well as to control health risks associated with environmental changes.

##### Justification of the effort and European added value

The recent food crises, and in particular bovine spongiform encephalopathy (BSE), have highlighted both the complexity of food safety issues and the fact that in most cases they have international and cross-border implications.

The integration of the European internal market as regards agriculture and food makes it necessary to address the problems that arise in this area, and hence to carry out related research, on a European scale. It is against this background that the European Food Safety Authority has been established <sup>(1)</sup>.

Citizens and consumers expect that research will help to ensure that the food and products marketed are of high quality, healthy and can be consumed in safety. To this end, emphasis should be placed on the whole food production chain, 'from farm to fork', including, where appropriate, application of animal and plant sciences and biotechnology to this area. Requirements relating to animal welfare and health should be taken into account.

<sup>(1)</sup> OJ L 31, 1.2.2002, p. 1.

This requires the availability of the most complete, precise and up to date scientific knowledge. Apart from the public health aspect, the prosperity of a sector representing some EUR 600 billion in terms of annual turnover and 2,6 million jobs is at stake.

Given that small enterprises constitute a major part of the food sector, the success of activities undertaken will rely on the adaptation of knowledge and processes to the specific characteristics of these enterprises.

Europe also needs to be able to make a substantial contribution to the research efforts on these issues, which now arise at world level, as well as a coherent contribution to the international debate on them, based on the most precise and complete knowledge.

The same remarks apply to the various aspects of the problems associated with the health impact of environmental factors (e.g. endocrine disruptors, carcinogens) which are a source of growing concern for European citizens, and which often manifest themselves on an international scale. For all these reasons, but also in order to derive the benefit of the combination of the best sources of expertise available in complex areas, the research in question should be carried out at European level in such a way as to ensure genuine coordination of national activities.

#### Actions envisaged

Community activities will cover research, including, where appropriate, post-genomics research, relating to various aspects of the control of health risks and links between health and food:

- (a) safer and environmentally friendly production and processing methods and healthier, nutritious, functional and varied foodstuffs and animal feed, based on systems such as integrated production, lower-input farming including organic agriculture, and the use of plant and animal sciences and biotechnologies;
- (b) epidemiology of food-related diseases and allergies, including the impact of diet on the health of children and methods for the analysis of causes of food-related allergies;
- (c) impact of food, for instance new products, products resulting from organic farming, functional food, products containing genetically modified organisms and those arising from recent biotechnology developments on health;
- (d) 'traceability' processes all along the production chain, for instance relating to genetically modified organisms, including those based on recent biotechnology developments;
- (e) methods of analysis, detection and control of chemical contaminants and existing or emerging pathogenic micro-organisms (such as viruses, bacteria, yeasts, fungi, parasites and new agents of the prion type including development of ante-mortem diagnostic tests for BSE and scrapie);
- (f) impact of animal feed, including products containing genetically modified organisms and the use of sub-products of different origins for that feed, on human health;
- (g) environmental health risks linked to the food chain (chemical, biological and physical), and combined exposures of authorised substances, including impact of local environmental disasters and pollution on the safety of foodstuffs, with emphasis being placed on cumulative risks, transmission routes to human beings, long-term effects and exposure to small doses, as well as the impact on particularly sensitive groups, and especially children.

#### 1.1.6. *Sustainable development, global change and ecosystems*

##### Objective

The activities carried out in this area are intended to strengthen the scientific and technological capacities needed for Europe to be able to implement sustainable development, emphasised by the Göteborg European Council, and integrating its environmental, economic and social objectives with particular regard to renewable energy, transport, and sustainable management of Europe's land and marine resources. These activities should enable Member States, the associated candidate and other associated countries to make a significant contribution to the international efforts to understand and control global change and preserve the equilibrium of ecosystems.

### Justification of the effort and European added value

The implementation on a global scale of sustainable development requires more particularly:

- (a) the design, development and dissemination of technologies and solutions, such as promotion of changes in energy consumption behaviour (leading to an energy-intelligent Europe) and new approaches relating to mobility, making it possible to ensure the conservation and more rational, efficient and sustainable use of natural resources, with less waste and emissions and a reduction in the impact of economic activity on the environment. Sectors of strategic importance in this context include energy and transport, especially the urban and regional development aspects of these sectors;
- (b) a better understanding of ecosystems and of the mechanisms and impacts of global change (for instance climate change), including the effect of these mechanisms on land and marine resources; as well as the development of related forecasting capacities.

Where technology is concerned, as highlighted in the Commission Green Paper 'Towards a European strategy for the security of energy supply' and in the Commission's White Paper 'European transport policy for 2010: time to decide', two areas concerned as a matter of priority are energy and transport, which are responsible for over 80 % of total emissions of greenhouse gases and more than 90 % of CO<sub>2</sub> emissions.

Under the 1997 Kyoto Protocol to the 1992 United Nations framework Convention on climate change, the European Union is required to reduce its greenhouse gas emissions by 8 % compared with the 1990 levels in the period 2008 to 2012. This will require the development of innovative sustainable energy and transport solutions. Other important commitments are contained in international instruments such as the 1992 UN Convention on biological diversity, the 1994 UN Convention to combat desertification in countries seriously affected by drought and/or desertification, particularly in Africa, and the 1987 Montreal Protocol on substances that deplete the ozone layer as well as in the Union strategy for sustainable development, including the sixth environment action programme.

Achieving the above objective in the short term requires a major effort to deploy technologies currently under development. Community action is important to ensure coordination of Europe's contribution to world efforts.

Above and beyond this objective, the long-term implementation of sustainable development in the coming decades makes it necessary to ensure the availability, under economic conditions, of the most appropriate energy sources and carriers in this respect. This will require a sustained longer-term research effort.

Medium and long-term research efforts will also be necessary to develop sustainable European transport systems, and to make progress in the context of global change and protection of biodiversity and preserving ecosystems which would also contribute to the sustainable use of land and marine resources. In the context of global change, strategies for an integrated, sustainable use of agricultural and forest ecosystems are of particular importance for the preservation of these ecosystems and will contribute substantially to the sustainable development of Europe.

### Actions envisaged

The Community's RTD efforts will concentrate on activities in the following areas:

#### I. Sustainable energy systems <sup>(1)</sup>

- (a) in the short and medium term, especially in the urban environment:
  - (i) clean energy, in particular renewable energy sources and their integration in the energy system, including storage, distribution and use;
  - (ii) energy savings and energy efficiency, including those to be achieved through the use of renewable raw materials;
  - (iii) alternative motor fuels;

<sup>(1)</sup> Other energy-related topics are included under Section 1.2.1. ('Policy support and anticipating scientific and technological needs') and in Heading III.

- (b) in the medium and longer term:
  - (i) fuel cells including their applications;
  - (ii) new technologies for energy carriers, transport and storage on a European scale, in particular hydrogen technology;
  - (iii) new and advanced concepts in renewable energy technologies with a significant future energy potential and requiring long-term research efforts;
  - (iv) disposal of CO<sub>2</sub> associated with cleaner fossil fuel plants.

## II. Sustainable surface transport <sup>(1)</sup>

- (a) Developing environmentally friendly, safe and competitive transport systems and means of transport of passengers and freight, and clean urban transport with rational use of the car in the city:
  - (i) new technologies and concepts for surface transport, including novel propulsion systems and integration of fuel cells for transport purposes;
  - (ii) advanced design and production techniques leading to improved quality, safety, recyclability, comfort and cost-effectiveness;
- (b) making rail and maritime transport more effective and more competitive, addressing the interoperability of transport modes, and assuring intelligent and safe transport of passengers and freight:
  - (i) rebalancing and integrating different modes, in particular in the urban and regional context, including new mobility management and transport logistics systems making rail and maritime transport more effective (for example, by means of promoting intermodality and interoperability);
  - (ii) increasing safety, and avoiding traffic congestion (in particular in urban areas), through the integration of innovative electronics and software solutions and by means of the use of advanced satellite navigation systems and telematics solutions.

## III. Global change and ecosystems

Community activities will address the following aspects as a matter of priority:

- (a) impact and mechanisms of greenhouse gas emissions and atmospheric pollutants from all sources, including those resulting from energy supplies, transport and agriculture on climate, ozone depletion and carbon sinks (oceans, forests and soil) in particular to improve prediction and to evaluate mitigation options;
- (b) water cycle, including soil-related aspects;
- (c) understanding marine and terrestrial biodiversity, marine ecosystem functions, protection of genetic resources, sustainable management of terrestrial and marine ecosystems and interactions between human activities and the latter;
- (d) mechanisms of desertification and natural disasters;
- (e) strategies for sustainable land management, including integrated coastal zone management (ICZM), and including integrated concepts for the multi-purpose utilisation of agricultural and forest resources, and the integrated forestry/wood chain;
- (f) operational forecasting and modelling, including global climate change observation systems.

Research undertaken under this priority will be complemented by the development of advanced methods for risk assessment and methods of appraising environmental quality, including relevant pre-normative research on measurements and testing for these purposes.

<sup>(1)</sup> Other transport policy-related topics (such as transport security, tools and indicators for transport system performance and forecasting) are dealt with under Section 1.2.1. ('Policy support and anticipating scientific and technological needs').



#### 1.1.7. *Citizens and governance in a knowledge-based society*

##### Objective

The activities carried out in this area are intended to mobilise in a coherent effort, in all their wealth and diversity, European research capacities in economic, political, social sciences and humanities that are necessary to develop an understanding of, and to address issues related to, the emergence of the knowledge-based society and new forms of relationships between its citizens, on the one hand and between its citizens and institutions, on the other.

##### Justification of the effort and European added value

At the European Council in Lisbon in March 2000, the European Union set itself the ambitious objective of becoming 'the most competitive and dynamic knowledge-based economy in the world, capable of sustained economic growth providing more and better jobs and greater social cohesion'.

In this perspective, the European Council in Lisbon underlined that 'human resources are Europe's main strength', stressing the need for Europe's education and training systems to 'adjust both to the needs of the knowledge-based society and to the need to raise the level of employment and improve quality'.

Europe's transition towards a knowledge-based economy and society, and its sustainable development in the interests of the quality of life of all citizens will be all the easier if it takes place in a way which is properly understood and managed. This requires a substantial research effort concerning the issues of integrated and sustainable economic and social progress based on the fundamental values of justice and solidarity and cultural diversity which characterise the European model of society, as well as research on issues relating to entrepreneurship and the setting up, growth and development of small enterprises.

In this respect, economic, political, social and human sciences research should more particularly help to ensure the harnessing and exploitation of an exponentially increasing quantity of information and knowledge and an understanding of the processes at work in this area.

In Europe, this issue arises in particular in connection to the future enlargement, the functioning of democracy and new forms of governance, and in the general context of this. What is at stake is the relationship between citizens and institutions in a complex political and decision-making environment characterised by the coexistence of national, regional and European decision-making levels and the increasing role of civil society and its representatives in the political debate.

Issues such as these have a clear and intrinsic European dimension, and there is much to be gained by examining them from a global perspective, taking into account the historical dimension as well as the cultural heritage.

This European dimension is only just starting to be taken into account in research conducted at national level, and is not yet receiving all the attention that it requires.

It seems highly appropriate to address these aspects on the European scale. What is more, action taken at Union level will make it possible to ensure the requisite degree of methodological coherence and guarantee that full benefit is derived from the rich variety of approaches existing in Europe and European diversity.

##### Actions envisaged

Action by the Community will focus on the following themes:

knowledge-based society and social cohesion:

- (a) research with reference to the objectives set by the Lisbon European Council and subsequent Councils, in particular systematic analysis of best methods for improving the production, transmission and utilisation of knowledge in Europe;

- (b) options and choices for the development of a knowledge-based society serving the Union objectives emphasised at the Lisbon, Nice and Stockholm European Councils, in particular as regards improving the quality of life, social, employment and labour market policies, lifelong learning, and strengthening social cohesion and sustainable development with due consideration for the various social models in Europe and taking into account aspects relating to the ageing of the population;
- (c) variety of transition dynamics and paths towards the knowledge-based society at local, national and regional level;

citizenship, democracy and new forms of governance, in particular in the context of increased integration and globalisation, and from the perspectives of history and cultural heritage:

- consequences of European integration and enlargement of the Union for democracy, the concept of legitimacy, and the functioning of Union institutions through a better understanding of political and social institutions in Europe, and their historical evolution,
- research on the redefinition of and the relationship between areas of competence and responsibility, and new forms of governance,
- issues connected with the resolution of conflicts and restoration of peace and justice, including the safeguarding of fundamental rights,
- emergence of new forms of citizenship and cultural identities, forms and impact of integration and cultural diversity in Europe; social and cultural dialogue involving Europe as well as the rest of the world.

In operational terms, Community activities will focus on support for:

- (a) transnational research and comparative studies and the coordinated development of statistics and qualitative and quantitative indicators;
- (b) interdisciplinary research in support of public policies;
- (c) the establishment and exploitation on a European scale of research infrastructures and data and knowledge bases.

## 1.2. **Specific activities covering a wider field of research**

### 1.2.1. ***Policy support and anticipating scientific and technological needs***

These activities will assure efficient and flexible conduct of research essential for the fundamental objectives of the Community, by underpinning the formulation and implementation of Community policies and by exploring new and emerging scientific problems and opportunities, where these requirements cannot be satisfied under the thematic priorities.

A feature common to these activities is that they will be implemented within a multi-annual perspective which takes direct account of the needs and viewpoints of the main associated actors (as appropriate: policy makers, industrial user groups, leading edge research communities etc.). In principle, they will be implemented in conjunction with an annual programming mechanism, by which specific priorities, corresponding to identified needs and falling within the objectives indicated above, will be determined.

#### A. **Policy-oriented research**

Research activities under this heading are intended to respond to the scientific and technological needs of the policies of the Community, underpinning the formulation and implementation of Community policies, bearing in mind also the interests of future members of the Community and associated countries. They may include pre-normative research, measurement and testing where necessary for the needs of Community policies.

These activities require flexible, policy-driven definition and specific actions and methods of intervention to complement the thematic priorities and to be coordinated within the overall context of this programme.

They will accordingly include themes linked to the thematic priorities, but which do not lend themselves to the science-driven approach for identifying the relevant individual topics. Appropriate division of tasks, and synergy, will also be assured between these activities and the direct actions of the Joint Research Centre, oriented towards the needs of the Community policies.

The areas concerned to be supported are as follows:

- (a) the common agricultural policy (CAP) and the common fisheries policy (CFP);
- (b) sustainable development, in particular the Community policy objectives relating to environment (including those set out in the sixth environment action programme), transport and energy;
- (c) other Community policies, namely health (in particular public health), regional development, trade, development aid, internal market and competitiveness, social policy and employment, education and training, culture, gender equality, consumer protection, the creation of an area of freedom, security and justice, and external relations, including those policies in support of enlargement, and including the requisite statistical methods and tools;
- (d) Community policy objectives derived from the orientations given by the European Council with regard to, for instance, economic policy, the information society as well as e-Europe and enterprise.

Within these areas, the research priorities, responding to initially identified policy needs, which will be supplemented during the course of the implementation of this programme, are as follows:

1. *Sustainable management of Europe's natural resources*

Research under this heading will in particular focus on:

- (a) the modernisation and sustainability of agriculture and forestry, including their multifunctional role in order to ensure the sustainable development and promotion of rural areas;
- (b) tools and assessment methods for sustainable agriculture and forestry management;
- (c) the modernisation and sustainability of fisheries, including aquaculture-based production systems;
- (d) new and more environment friendly production methods to improve animal health and welfare;
- (e) environmental assessment (soil, water, air, noise, including the effects of chemical substances);
- (f) assessment of environmental technologies for support of policy decisions, in particular concerning effective but low-cost technologies in the context of fulfilling environmental legislation.

2. *Providing health, security and opportunity to the people of Europe*

Research under this heading will focus in particular on:

- (a) health determinants and the provision of high quality and sustainable health care services and pension systems (in particular in the context of ageing and demographic change);
- (b) public health issues, including epidemiology contributing to disease prevention and responses to emerging rare and communicable diseases, allergies, procedures for secure blood and organ donations, non-animal test methods;
- (c) the impact of environmental issues on health (including methods for risk assessment and the mitigation of risks of natural disasters to people);
- (d) quality of life issues relating to handicapped/disabled people (including equal access facilities);
- (e) understanding of migration and refugee flows;

- (f) understanding crime trends in the context of public safety;
- (g) issues related to civil protection (including bio-security and protection against risks arising from terrorist attacks) and crisis management.

3. *Underpinning the economic potential and cohesion of a larger and more integrated European Union*

Research under this heading will in particular focus on:

- (a) underpinning European integration, sustainable development, competitiveness and trade policies (including improved means to assess economic development and cohesion);
- (b) the development of tools, indicators and operational parameters for assessing sustainable transport and energy systems performance (economic, environmental and social);
- (c) global safety analysis and validation systems for transport and research relating to accident risks and safety in mobility systems;
- (d) forecasting and developing innovative policies for sustainability in the medium and long term;
- (e) information society issues (such as management and protection of digital assets, and inclusive access to the information society);
- (f) the protection of cultural heritage and associated conservation strategies;
- (g) improved quality, accessibility and dissemination of European statistics.

B. *Research to explore new and emerging scientific and technological problems and opportunities*

The research activities carried out under this heading are intended to respond flexibly and rapidly to major unforeseeable developments, emerging scientific and technological problems and opportunities, as well as needs appearing at the frontiers of knowledge, more specifically in multi-thematic and interdisciplinary areas.

In this context, the following activities will be carried out:

- (a) research in emerging areas of knowledge and on future technologies, outside or cutting across the thematic priority areas, in particular in transdisciplinary fields, which is highly innovative and involves correspondingly high (technical) risks. It will be open to new scientific endeavours at the frontiers of knowledge and technological know-how that have significant potential for major industrial and/or social impact, or for the development of Europe's research capabilities in the longer term;
- (b) research to assess rapidly new discoveries, or newly observed phenomena, which may indicate emerging risks or problems of high importance to European society, and identify appropriate responses to them.

In identifying potential research topics under this heading, special attention will be given to the views of the research community and to areas where European action is appropriate in view of the potential to develop strategic positions at the leading edge of knowledge and in new markets, or to anticipate major issues facing European society.

1.2.2. ***Horizontal research activities involving SMEs***

Carried out in support of European competitiveness and enterprise and innovation policy, these specific activities are intended to help European SMEs in traditional or new areas to boost their technological capacities and develop their ability to operate on a European and international scale.

Information and advice about the possibilities of SME involvement will be ensured via entry points set up by the Commission, and by making use of the national contact point scheme.

In addition to these specific research activities for SMEs, SMEs will be encouraged to participate in all areas of this programme, in particular in the context of the activities carried out in the priority thematic areas.

Actions that may be carried out in the entire field of science and technology covered by Community research policy, will take the form of:

(a) Cooperative research activities

Research activities carried out by RTD performers for a number of SMEs on themes of common interest. These activities may also be carried out by innovative SMEs in cooperation with research centres and universities;

(b) Collective research activities

Research activities carried out by RTD performers for industrial associations or industry groupings in entire sectors of industry where SMEs are prominent at the European level, including dissemination of results.

1.2.3. ***Specific measures in support of international cooperation***

In support of the external relations, including the development policy of the Community, specific measures aimed at encouraging international research cooperation will be undertaken. Apart from these specific measures, third country participation will be possible within the thematic priorities. The following groups of third countries will be involved:

- (a) developing countries;
- (b) Mediterranean countries, including the western Balkans;
- (c) Russia and the New Independent States (NIS) including, in particular, activities carried through the International Association for the Promotion of Cooperation with Scientists from the NIS (INTAS).

The research priorities in this category of activities are defined according to the interests and objectives of the partnership between the Community and the groups of countries concerned, as well as their specific economic and social needs.

In order to facilitate the involvement of these countries a single entry point within the Commission will be created for information about activities undertaken in the fields of international cooperation.

These activities are complementary to international research cooperation undertaken within the thematic priority areas.

1.3. **Non-nuclear activities of the Joint Research Centre (JRC)**

In accordance with its mission of providing scientific and technical support for Community policies, the JRC will provide independent, customer-driven support for the formulation and implementation of Community policies, including the monitoring of the implementation of such policies, within the areas of its specific competence.

The JRC will carry out its activities in close cooperation and by networking with scientific circles, national research organisations, universities and businesses in Europe. It is entitled to participate in all research activities of this programme on the same basis as entities established in Member States. Special attention will be given to cooperation with candidate countries.

The essential common denominator of the JRC's activities will be the safety of citizens in its different aspects, e.g. health, environment and combating fraud.

Under this heading, the JRC will carry out the following activities:

1. Activities to be carried out in accordance with the JRC mission. These activities will be clearly geared towards customer needs. In this context, there will be a degree of flexibility for unexpected research needs.

Research will be concentrated on two core areas related to two of the priority thematic areas:

- (a) food, chemical products and health, with particular attention to:

food safety and quality, in particular to combat BSE; genetically modified organisms; chemical products, including validation of alternative non-animal testing procedures; biomedical applications (more particularly the establishment of references in this area);

- (b) environment and sustainability, with particular attention to:

Climate change (carbon cycle, modelling, impacts) and technologies for sustainable development (renewable energy sources, tools for the integration of policies); improvement of air quality, protection of the European environment; development of reference measurements and networks; technical support for the objectives of GMES.

2. Horizontal activities in domains for which the JRC has specific competence:

- (a) technology foresight: technological and economic foresight work based on the activities of European networks;
- (b) reference materials and measurements: the Community reference bureau (BCR) and certified reference materials; validation and qualification of chemical and physical measurement methods;
- (c) the safety of citizens and anti-fraud: detection of anti-personnel mines; prevention of natural and technological hazards; networks in support of cybersecurity; fraud control technologies.

## II. STRUCTURING THE EUROPEAN RESEARCH AREA

### 2.1. Research and innovation

#### Objective

These activities are intended to stimulate technological innovation, utilisation of research results, transfer of knowledge and technologies and the setting up of technology businesses in the Community and in all its regions, not least in the less developed areas. Innovation is also one of the most important elements throughout this programme.

#### Justification of the effort and European added value

Europe's comparatively poor ability to transform the results of research work and scientific and technological breakthroughs into industrial, economic and commercial successes, is one of its most notable weaknesses. Actions to stimulate business innovation at European level can help to raise the overall level of Europe's performance and increase European capacities in this area, by helping businesses and innovators in their efforts to operate on a European scale and on international markets, and by giving stakeholders in all regions of the Union the benefit of the experience and knowledge acquired in other regions through initiatives undertaken at this level.

#### Actions envisaged

Activities will be carried out under this heading to complement activities relating to innovation included in those carried out under Heading I.

These actions will provide general support to innovation, and will complement national and regional activities, with a view to increasing the coherence of efforts in this area. They will take the form of support for:

- (a) networking of stakeholders and users in the European innovation system and carrying out analyses and studies in order to promote exchanges of experience and good practice and to engage users better in the innovation process;
- (b) actions to encourage transregional cooperation regarding innovation and support for the setting-up of technology businesses, as well as for the preparation of regional and transregional strategies in this area, including the accession countries;

- (c) actions to experiment with new tools and new approaches concerning technological innovation addressing in particular critical points in the innovation process;
- (d) establishment or consolidation of information services and in particular electronic services, such as CORDIS, and assistance services relating to innovation (technology transfer, protection of intellectual property, access to risk capital); including the activities of innovation relay centres;
- (e) economic and technological intelligence activities (analyses of technological developments, applications and markets and processing and dissemination of information which may help researchers, entrepreneurs, and in particular SMEs, and investors in their decision-making);
- (f) analysis and evaluation of innovation activities carried out in the framework of Community research projects and exploitation of lessons that can be drawn from innovation policies.

Some of these activities will be carried out in liaison with those of the European Investment Bank (EIB) (in particular by means of the European Investment Fund (EIF)) under its 'Innovation 2000 initiative' as well as in coordination with measures taken through the Structural Funds.

## 2.2. Human resources and mobility

### Objective

The activities carried out under this heading are intended to support the development of abundant world-class human resources in all the regions of the Community by promoting transnational mobility for training purposes, the development of expertise or the transfer of knowledge, in particular between different sectors; supporting the development of excellence; and helping to make Europe more attractive to third country researchers. This should be done with the aim of making the most of the potential offered by all sectors of the population, especially women and younger researchers, taking appropriate measures for this purpose, including those taken towards creating synergies in the area of higher education in Europe.

### Justification of the effort and European added value

Promoting transnational mobility is a simple, particularly effective and powerful means of boosting European excellence as a whole, as well as its distribution in the different regions of the Union. It creates opportunities for significantly improving the quality of the training of researchers, promotes the circulation and exploitation of knowledge, and helps to establish world-class centres of excellence that are attractive throughout Europe. Union level action in this area (as in human resources in general) leading to the attainment of critical mass will inevitably have a major impact.

Attention will be paid to the participation of women within all actions, and appropriate measures to promote a more equitable balance between men and women in research; the personal circumstances relating to mobility, particularly with respect to the family, career development and languages; the development of research activity in the less-favoured regions of the Union and associated countries, and to the need for increased and more effective cooperation between research disciplines and between academia and industry, including SMEs.

In cooperation with the most appropriate national and Community actions, attention will be paid to the provision of practical assistance to foreign researchers in matters (legal, administrative, family or cultural) relating to their mobility.

### Actions envisaged

These activities, which will be carried out in the whole field of science and technology, will take in particular the following forms:

- (a) support measures for universities, research centres, businesses including in particular SMEs and networks, for the hosting of European and third country researchers, including training of pre-doctoral researchers. These activities could include the setting up of long-term training networks and encouraging mobility between different sectors;

- (b) individual support measures for European researchers for the purposes of mobility to another European or a third country, and for top-class third country researchers wishing to come to Europe. Such support will provide for a sufficiently long training period and focus on researchers with at least four years of research experience, while also addressing the needs of training in research management;
- (c) financial contribution to national or regional programmes in support of researcher mobility open to researchers from other European countries;
- (d) support for the creation and development of European research teams which are considered as having the potential to reach a high level of excellence, more particularly for leading edge or interdisciplinary research activities where such support can add value to national measures;
- (e) scientific prizes for work of excellence carried out by a researcher having received Union financial support for mobility.

Mechanisms will be set up to facilitate the return of researchers to their countries or regions of origin, and their professional reintegration.

Efforts aimed at achieving equal gender representation in the actions envisaged will be ensured.

### 2.3. **Research infrastructures**

#### Objective

The activities carried out under this heading are intended to help establish a fabric of research infrastructures of the highest level in Europe and to promote their optimum use on a European scale.

#### Justification of the effort and European added value

The development of a European approach with regard to research infrastructures, and the carrying out of activities in this area at Union level, can make a significant contribution to boosting European research potential and its exploitation: by helping to ensure wider access to the infrastructures existing in the different Member States and increasing the complementarity of the facilities in place; by promoting the development or establishment of infrastructures ensuring a service on a European scale, as well as optimum construction choices in European terms and in terms of regional and transregional technological development.

These activities will be carried out in the whole field of science and technology, including in the priority thematic areas.

#### Actions envisaged:

- (a) transnational access to research infrastructures;
- (b) implementing integrated activities, by means of European-scale infrastructures or consortia of infrastructures, making it possible to ensure the provision of services on a European scale and possibly covering, in addition to transnational access, the establishment and operation of cooperation networks, and the execution of joint research projects; raising the level of the performance of the infrastructures concerned;
- (c) a high-capacity and high-speed European communication infrastructure (possibly based on GRID-type architectures), building on the achievements of the Géant project as well as electronic publishing services;
- (d) carrying out feasibility studies and preparatory work for the creation of new European scale infrastructures taking into account the needs of all potential users and systematically exploring the possibilities of contributions from e.g. the EIB or the Structural Funds for the funding of these infrastructures;
- (e) optimising of European infrastructures by providing limited support for the development of a restricted number of projects for new infrastructures in duly justified cases where such support could have a critical catalysing effect in terms of European added value. This support, taking due account of Member States' opinion, may supplement contributions from the EIB or the Structural Funds to the funding of these infrastructures.



## 2.4. Science and society

### Objective

The activities carried out under this heading are intended to encourage the development of harmonious relations between science and society and the opening-up of innovation in Europe, as well as contributing to scientists' critical thinking and responsiveness to societal concerns, as a result of the establishment of new relations and an informed dialogue between researchers, industrialists, political decision-makers and citizens. The activities under this heading are policy-related science and society initiatives, while the research activities under the thematic priorities and in particular thematic priority 7 cover in a broader manner research relating to citizens and governance.

### Justification of the effort and European added value

Science/society issues need to a large extent to be addressed at European level on account of their strong European dimension. This is bound up with the fact that very often they arise on a European scale (as the example of food safety problems shows), with the importance of being able to benefit from the often complementary experience and knowledge required in the different countries and with the need to take into account the variety of views on them, which reflects European cultural diversity.

### Actions envisaged

The activities carried out in this area in the whole field of science and technology will in particular address the following themes:

- (a) bringing research closer to society: science and governance; scientific advice; involvement of society in research; foresight;
- (b) responsible use of scientific and technological progress, in harmony with fundamental ethical values: assessment, management and communication of uncertainty and risk; expertise; analysis and support to best practice in the application of the precautionary principle in different areas of policy making; European reference system; research on ethics in relation to science, technology developments and their applications;
- (c) stepping up the science/society dialogue: new forms of dialogue with the participation of relevant stakeholders; knowledge of science by citizens; stimulation of awareness; promoting young people's interest in scientific careers; initiatives aimed at promoting the role and place of women in science and research at all levels.

They will take the form of activities in support of:

- (a) networking and establishment of structural links between the institutions and activities concerned at national, regional and European level, in particular using information society technologies;
- (b) exchange of experience and good practice;
- (c) carrying out specific research;
- (d) high-profile awareness-raising initiatives such as prizes and competitions;
- (e) establishing data and information bases and carrying out studies, in particular statistical and methodological studies, on the different themes.

## III. STRENGTHENING THE FOUNDATIONS OF THE EUROPEAN RESEARCH AREA

### Objective

The activities carried out under this heading are intended to step up the coordination and to support the coherent development of research and innovation-stimulation policies and activities in Europe.

### Justification of the effort and European added value

Making a reality of the European Research Area depends first and foremost on improving the coherence and coordination of research and innovation activities and policies conducted at national, regional and European level. Action by the Community can help to promote efforts to this end, as well as to lay the foundations in terms of the information, knowledge and analyses that are essential for the successful completion of this project.

### Actions envisaged

A. Coordination activities, using a bottom up approach, will be carried out in the whole field of science and technology in areas such as:

- (a) health: health of key population groups; major diseases and disorders (e.g. cancer, diabetes and diabetes-related diseases, degenerative diseases of the nervous system, psychiatric diseases, cardiovascular diseases, hepatitis, allergies, visual impairment), rare diseases, alternative or non-conventional medicine and major diseases linked to poverty in developing countries; activities involved will be implemented, for instance, through coordination of research and comparative studies, development of European databases and interdisciplinary networks, exchange of clinical practice and coordination of clinical trials;
- (b) biotechnology: non-health and non-food applications;
- (c) environment: urban environment (including sustainable urban development and cultural heritage); marine environment and land/soil management; seismic risk;
- (d) energy: new generation power plants ('near-zero-emission'), energy storage, transport and distribution.

These activities will take the form of stepping up the coordination of research activities carried out in Europe, at both national and European level with financial support for:

- (a) the mutual opening-up of national and regional programmes;
- (b) networking of research activities conducted at national and regional level;
- (c) the administration and coordination activities of European cooperation in the field of scientific and technological research (COST);
- (d) scientific and technological coordination activities carried out in other European cooperation frameworks, in particular the European Science Foundation;
- (e) collaboration and joint initiatives of specialised European scientific cooperation organisations such as CERN, EMBL, ESO, ENO and the ESA <sup>(1)</sup>.

These actions will be implemented in the general context of efforts undertaken to optimise the overall performance of European scientific and technological cooperation and ensure that its different components, including COST and Eureka, are complementary.

B. In order to support the coherent development of research and innovation policies in Europe:

- (a) carrying out analyses and studies, and work relating to scientific and technological foresight, statistics and indicators;
- (b) setting up and support for the operation of specialised working groups and forums for concertation and political debate;
- (c) support for work on the benchmarking of research and innovation policies at national, regional and European level;
- (d) support for carrying out work on the mapping of scientific and technological excellence in Europe;
- (e) support for carrying out the work needed to improve the regulatory and administrative environment for research and innovation in Europe.

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<sup>(1)</sup> CERN: European Organisation for Nuclear Research; EMBL: European Molecular Biology Laboratory; ESO: European Southern Observatory; ENO: European Northern Observatory; ESA: European Space Agency.

## ANNEX II

## MAXIMUM OVERALL AMOUNT, RESPECTIVE SHARES AND INDICATIVE BREAKDOWN

The maximum overall financial amount and the respective indicative shares of the various activities as referred to in Article 164 of the Treaty are as follows:

	(EUR million)
First activity <sup>(1)</sup>	13 800
Second activity <sup>(2)</sup>	600
Third activity <sup>(3)</sup>	290
Fourth activity <sup>(4)</sup>	1 580
Maximum overall amount	16 270

<sup>(1)</sup> Covering the activities carried out under the heading 'Focusing and integrating Community research', with the exception of international cooperation activities; research infrastructures, and the theme 'Science and society' carried out under the heading 'Structuring the European Research Area' and activities carried out under the heading 'Strengthening the foundations of the European Research Area'.

<sup>(2)</sup> Covering the international cooperation activities carried out under the heading 'Focusing and integrating Community research', in the thematic priority areas and under the heading 'Specific activities covering a wider field of research'.

<sup>(3)</sup> Covering the specific activities on the theme 'Research and innovation' carried out under the heading 'Structuring the European Research Area' in addition to innovation activities carried out under the heading 'Focusing and integrating Community research'.

<sup>(4)</sup> Covering the activities concerning human resources and support for mobility carried out under the heading 'Structuring the European Research Area'.

These activities will be carried out under the following headings (the indicative financial breakdown is set out):

			(EUR million)
1. Focusing and integrating Community research			13 345
Thematic priorities <sup>(1)</sup>		11 285	
Life sciences, genomics and biotechnology for health <sup>(2)</sup>	2 255		
= Advanced genomics and its applications for health	1 100		
= Combating major diseases	1 155		
Information society technologies <sup>(3)</sup>	3 625		
Nanotechnologies and nanosciences, knowledge-based multifunctional materials and new production processes and devices	1 300		
Aeronautics and space	1 075		
Food quality and safety	685		
Sustainable development, global change and ecosystems	2 120		
= Sustainable energy systems	810		
= Sustainable surface transport	610		
= Global change and ecosystems	700		
Citizens and governance in a knowledge-based society	225		

Specific activities covering a wider field of research		1 300	
Policy support and anticipating scientific and technological needs	555		
Horizontal research activities involving SMEs	430		
Specific measures in support of international cooperation	315		
Non-nuclear activities of the Joint Research Centre		760	
2. Structuring the European Research Area			2 605
Research and innovation	290		
Human resources	1 580		
Research infrastructures <sup>(4)</sup>	655		
Science and society	80		
3. Strengthening the foundations of the European Research Area			320
Support for the coordination of activities	270		
Support for the coherent development of policies	50		
TOTAL			16 270

<sup>(1)</sup> Of which at least 15 % for SMEs.

<sup>(2)</sup> Including up to EUR 400 million for cancer-related research.

<sup>(3)</sup> Including up to EUR 100 million for the further development of Géant and GRID.

<sup>(4)</sup> This amount of EUR 315 million will fund specific measures in support of international cooperation involving developing countries, Mediterranean countries including the western Balkans, and Russia and the New Independent States (NIS). Another EUR 285 million is earmarked to finance the participation of third-country organisations in the 'Thematic Priorities' and in the 'Specific activities covering a wider field of research', thus bringing the total amount devoted to international cooperation to EUR 600 million. Additional resources will be available under section 2.2 'Human resources and mobility' to fund research training for third-country researchers in Europe.

<sup>(5)</sup> Including up to EUR 200 million for the further development of Géant and GRID.

## ANNEX III

**INSTRUMENTS AND RULES FOR FINANCIAL PARTICIPATION BY THE COMMUNITY**

The Community will contribute financially, under the specific programmes, and subject to the rules for participation, to research and technological activities, including demonstration activities, of this programme.

These activities, which will incorporate measures to encourage innovation, will be implemented by means of a range of instruments described below, and referred to as 'Indirect RTD actions', to which the Community will contribute financially. In addition, the Community will undertake activities implemented by the JRC, and which are referred to as 'direct actions'.

**1. INSTRUMENTS****Introduction**

An instrument implementing an action must be commensurate with the scope and objectives of the research activity concerned, and will take into account, as appropriate, the views of the research community. Accordingly, the size of an action may vary in relation to the themes and subjects it covers, depending on the critical mass of expertise necessary to obtain European added value and achieve the expected results. In some cases, this may be achieved by the clustering of actions dedicated to different aspects of one and the same objective.

All instruments should involve, as appropriate, universities or institutions of higher education of a similar level, research organisations and industry, including SMEs. They could entail activities relating to dissemination, transfer and exploitation of knowledge as well as analysis and evaluation of the economic and social impact of the technologies concerned and the factors involved in their successful implementation.

As a general rule, selection of actions will be based on open calls for proposals and independent peer review, except in duly justified cases. All research activities will be reviewed regularly and this will, in particular, involve monitoring of the level of research excellence. The participation of SMEs including enterprise groupings of SMEs and smaller entities will be encouraged.

Concerning research in the priority thematic areas (under Heading I as defined in Annex I):

- the importance of the new instruments (integrated projects and networks of excellence) is recognised as being an overall priority means to attain the objectives of critical mass, management simplification and European added value contributed by Community research in relation to what is already undertaken at national level, and of the integration of the research capacities. However, the size of projects is not a criterion for exclusion, and access to new instruments is ensured for SMEs and other small entities,
- the new instruments will be used from the start of this programme in each theme and, where deemed appropriate, as a priority means, while maintaining the use of specific targeted research projects and coordination actions,
- in 2004 an evaluation will be undertaken by independent experts of the effectiveness of each of these three types of instruments in the execution of this programme.

Research activities in areas involving 'Specific activities covering a wider field of research' (under Heading I) will take the form of specific targeted research projects and specific research projects for SMEs. Networks of excellence and integrated projects may, however, be used in certain duly justified cases, where the objectives in question can be better achieved by these means.

Activities referred to under Heading II (Structuring the European Research Area) and Heading III (Strengthening the foundations of the European Research Area), will take the form of specific targeted research and innovation projects, integrated infrastructure initiatives and actions to promote human resources and mobility.

In addition, specific support actions, coordination actions and participation of the Community in programmes undertaken by several Member States pursuant to Article 169 of the Treaty may be applied throughout this programme.

### 1.1. Networks of excellence

The purpose of networks of excellence is to strengthen and develop Community scientific and technological excellence by means of the integration, at European level, of research capacities currently existing or emerging at both national and regional level. Each network will also aim at advancing knowledge in a particular area by assembling a critical mass of expertise. They will foster cooperation between capacities of excellence in universities, research centres, enterprises, including SMEs, and science and technology organisations. The activities concerned will be generally targeted towards long-term, multidisciplinary objectives, rather than predefined results in terms of products, processes or services.

A network of excellence will be implemented by a joint programme of activities involving some or, where appropriate, all of the research capacities and activities of the participants in the relevant area to attain a critical mass of expertise and European added value. A joint programme of activities could aim at the creation of a self-standing virtual centre of excellence that may result in developing the necessary means for achieving a durable integration of the research capacities.

A joint programme of activities will necessarily include those aimed at integration, as well as activities related to the spreading of excellence and dissemination of results outside the network.

Subject to conditions to be specified in the specific programmes and in the rules for participation the networks of excellence will have a high level of management autonomy including, where appropriate, the possibility to adapt the composition of the network and the content of the joint programme of activities.

### 1.2. Integrated projects

Integrated projects are designed to give increased impetus to the Community's competitiveness or to address major societal needs by mobilising a critical mass of research and technological development resources and competences. Each integrated project should be assigned clearly defined scientific and technological objectives and should be directed at obtaining specific results applicable in terms of, for instance, products, processes or services. Under these objectives they may include more long-term or 'risky' research.

Integrated projects should comprise a coherent set of component actions which may vary in size and structure according to the tasks to be carried out, each dealing with different aspects of the research needed to achieve common overall objectives, and forming a coherent whole and implemented in close coordination.

The activities carried out as part of an integrated project should include research and, as appropriate, technological development and/or demonstration activities, activities for the management and use of knowledge in order to promote innovation, and any other type of activity directly related to the objectives of the integrated project.

Subject to conditions to be specified in the specific programmes and in the rules for participation, the integrated projects will have a high level of management autonomy including, where appropriate, the possibility to adapt the partnership and the content of the project. They will be carried out on the basis of overall financing plans preferably involving significant mobilisation of public and private sector funding, including funding or collaboration schemes such as Eureka, EIB and EIF.

### 1.3. Specific targeted research or innovation projects

Specific targeted research projects will aim at improving European competitiveness. They should be sharply focussed and will take either of the following two forms, or a combination of the two:

- (a) a research and technological development project designed to gain new knowledge either to improve considerably or to develop new products, processes or services or to meet other needs of society and Community policies;
- (b) a demonstration project designed to prove the viability of new technologies offering potential economic advantage but which cannot be commercialised directly.

Specific targeted innovation projects are designed to test, validate and disseminate new innovation concepts and methods at the European level.

#### **1.4. Specific research projects for SMEs**

Specific research projects for SMEs may take either of the following forms:

- (a) cooperative research projects undertaken for the benefit of a number of SMEs on themes of common interest;
- (b) collective research projects carried out for industrial associations or industry groupings in entire sectors of industry where SMEs are prominent.

#### **1.5. Actions to promote and develop human resources and mobility**

Actions to promote and develop human resources and mobility will be targeted at training, development of expertise or transfer of knowledge. They will involve support to actions carried out by natural persons, host structures, including training networks, and also by European research teams.

#### **1.6. Coordination actions**

Coordination actions are intended to promote and support the coordinated initiatives of a range of research and innovation operators aiming at improved integration. They will cover activities such as the organisation of conferences, meetings, the performance of studies, exchanges of personnel, the exchange and dissemination of good practices, setting up information systems and expert groups, and may, if necessary, include support for the definition, organisation and management of joint or common initiatives.

#### **1.7. Specific support actions**

Specific support actions will complement the implementation of this programme and may be used to help in preparations for future Community research and technological development policy activities including monitoring and assessment activities. In particular, they will involve conferences, seminars, studies and analyses, high level scientific awards and competitions, working groups and expert groups, operational support and dissemination, information and communication activities, or a combination of these, as appropriate in each case. They may also include actions in support of research infrastructure relating to, for instance, transnational access or preparatory technical work (including feasibility studies) and the development of new infrastructure.

Specific support actions will also be implemented to stimulate, encourage and facilitate the participation of SMEs, small research teams, newly developed and remote research centres, as well as those organisations from the candidate countries in the activities of the priority thematic areas, in particular via the networks of excellence and the integrated projects. The implementation of these actions will rely on the specific information and assistance structures, including the network of national contact points, established by the Member States and the associated countries at local, regional and national level and will aim at ensuring a smooth transition from the fifth to the sixth framework programme.

#### **1.8. Integrated infrastructure initiatives**

Integrated infrastructure initiatives should combine in a single action several activities essential to reinforce and develop research infrastructures, in order to provide services at the European level. To this end, they should combine networking activities with a support activity (such as relating to transnational access) or research activities needed to improve infrastructure performance, excluding, however, the financing of investment for new infrastructures, which can only be financed as specific support actions. They will include a component of dissemination of knowledge to potential users, including industry and in particular to SMEs.

**1.9. Participation of the Community in programmes undertaken by several Member States (Article 169)**

Pursuant to Article 169 of the Treaty, this instrument will cover clearly identified programmes implemented by governments, national or regional authorities or research organisations and may be used in all the activities of this programme <sup>(1)</sup>. The joint implementation of these programmes will entail recourse to a specific implementation structure. This may be achieved by means of harmonised work programmes and common, joint or coordinated calls for proposals.

**2. DETAILED RULES FOR FINANCIAL PARTICIPATION BY THE COMMUNITY <sup>(2)</sup>**

The Community will implement the financial instruments in compliance with the Community framework for state aid to research and development, as well as international rules in this area, and in particular the WTO Agreement on Subsidies and Countervailing Measures. In compliance with this international framework, it will need to be possible to adjust the scale and form of financial participation under this programme on a case by case basis, in particular if funding from other public sector sources is available, including other sources of Community financing such as the EIB and EIF.

In the case of participation of bodies from regions lagging in development, when a project receives the maximum intensity of co-financing authorised under this Programme or an overall grant, an additional contribution from the Structural Funds, pursuant to Council Regulation (EC) No 1260/1999 of 21 June 1999 laying down general provisions on the Structural Funds <sup>(3)</sup>, could be granted.

In the case of participation of entities from the candidate countries, an additional contribution from the pre-accession financial instruments could be granted under similar conditions.

In the case of participation of organisations from Mediterranean or developing countries, a contribution of the MEDA programme and of the financial instruments of the Community's aid to development could be envisaged.

Financial participation by the Community will be granted in compliance with the principle of co-financing, with the exception of financing for studies, conferences and public tenders.

Financial participation by the Community will, except in duly justified cases, be decided following open calls for proposals or invitation to tender procedures. Selection of projects will be based on independent peer review.

The Commission will carry out the research activities in such a way as to ensure the protection of the Community's financial interests by means of effective controls and, if irregularities are detected, by means of dissuasive and proportionate penalties.

In the decisions adopting the specific programmes implementing this programme, there can be no derogations from the rules set out in the table below.

<sup>(1)</sup> It is recalled that national programmes to be carried out jointly pursuant to Article 169 of the Treaty are subject to decision by the European Parliament and the Council under the procedure provided for in Article 251 of the Treaty.

<sup>(2)</sup> It is recalled that, pursuant to Article 167 of the Treaty, the rules for the participation of undertakings, research centres and universities and for the dissemination of research results for the implementation of the framework programme are to be adopted by the European Parliament and the Council subject to the procedure provided for in Article 251 of the Treaty. These rules will cover, *inter alia*, minimum number of participants, the participation of bodies from candidate and third countries, criteria for evaluation and selection of RTD actions, management of RTD actions, liability issues and intellectual property rights.

<sup>(3)</sup> OJ L 161, 26.6.1999, p. 1.



**RTD activities and Community financial contribution according to type of instrument**

Type of instrument	RTD activities	Community contribution (*) <sup>(1)</sup>
Networks of excellence	<ul style="list-style-type: none"> <li>— Priority thematic areas</li> <li>— Policy support and anticipating scientific and technological needs</li> </ul>	Grant for integration: maximum of 25 % of the value of the capacity and resources proposed for integration by participants as a fixed amount to support the joint programme of activities <sup>(2)</sup>
Integrated projects	<ul style="list-style-type: none"> <li>— Priority thematic areas</li> <li>— Policy support and anticipating scientific and technological needs</li> </ul>	Grant to the budget of a maximum of: <ul style="list-style-type: none"> <li>— 50 % for research</li> <li>— 35 % for demonstration</li> <li>— 100 % for certain other activities such as training of researchers and consortium management <sup>(3)</sup> <sup>(4)</sup></li> </ul>
Specific targeted research or innovation projects	<ul style="list-style-type: none"> <li>— Priority thematic areas</li> <li>— Policy support and anticipating scientific and technological needs</li> <li>— Specific international cooperation activities</li> <li>— Promoting interaction between research and innovation</li> <li>— Developing harmonious relations between science and society</li> </ul>	Grant to the budget of a maximum of 50 % of the budget <sup>(3)</sup> <sup>(4)</sup>
Participation in programmes undertaken by several Member States (Article 169)	<ul style="list-style-type: none"> <li>— All activities of the sixth framework programme</li> </ul>	To be defined in subsequent decisions taken on the basis of Article 169
Specific research projects for SMEs	<ul style="list-style-type: none"> <li>— Specific research activities for SMEs</li> </ul>	Grant to the budget of a maximum of 50 % of the budget <sup>(3)</sup> <sup>(4)</sup>
Actions to promote and develop human resources and mobility	<ul style="list-style-type: none"> <li>— Promotion of human resources and mobility</li> </ul>	Grant to the budget of a maximum of 100 % of the budget <sup>(3)</sup> , if necessary as a lump sum
Coordination actions	<ul style="list-style-type: none"> <li>— In all the activities of the sixth framework programme</li> </ul>	Grant to the budget of a maximum of 100 % of the budget <sup>(3)</sup>
Specific support actions	<ul style="list-style-type: none"> <li>— In all the activities of the sixth framework programme</li> </ul>	Grant to the budget of a maximum of 100 % of the budget <sup>(3)</sup> <sup>(6)</sup> , if necessary as a lump sum

Type of instrument	RTD activities	Community contribution (*) <sup>(1)</sup>
Integrated infrastructure initiatives	— Support for research infrastructures	Grant to the budget: depending on the type of activity, of a maximum of 50 % to 100 % of the budget <sup>(2)</sup> <sup>(4)</sup> <sup>(5)</sup>
Direct actions	— Non-nuclear activities of the Joint Research Centre	100 % <sup>(7)</sup>

(\*) In this column budget means a financial plan estimating all the resources and expenditure needed to carry out the action.

<sup>(1)</sup> As a general principle, the Community financial contribution cannot cover 100 % of the expenditure of an indirect action with the exception of proposals covering a purchase price governed by the terms applicable to public procurement procedures or taking the form of a pre-defined lump sum pre-set by the Commission.

However, the Community financial contribution may bear up to 100 % of the expenditure of an indirect action if they complement those otherwise borne by the participants. Also, in the specific case of coordination actions, it covers up to 100 % of the budget necessary for the coordination of activities funded by the participants themselves.

<sup>(2)</sup> This rate varies for different areas.

<sup>(3)</sup> Subject to specific conditions specific legal entities, particularly public bodies, will receive funding of up to 100 % of their marginal/additional cost.

<sup>(4)</sup> The rates of assistance may be differentiated in accordance with the rules of the Community framework for State aid for research and development depending on whether activities relate to research (maximum 50 %) or demonstration (maximum 35 %) or to other activities implemented, such as training of researchers (maximum 100 %) or the management of the consortium (maximum 100 %).

<sup>(5)</sup> The activities of an integrated initiative relating to infrastructure must include one networking activity (coordination action: maximum 100 % of the budget) and at least one of the following activities: research activities (maximum 50 % of the budget) or specific service activities (specific support action, for example, transnational access to research infrastructures: maximum 100 % of the budget).

<sup>(6)</sup> For actions in support of research infrastructure relating to preparatory technical work (including feasibility studies) and the development of new infrastructure, sixth framework programme participation is restricted to maximum of 50 % and 10 % of the budget respectively.

<sup>(7)</sup> In addition, the JRC will be entitled to participate in indirect actions on the same basis as entities established in Member States.

## II

(Acts whose publication is not obligatory)

## COUNCIL

## COUNCIL DECISION

of 3 June 2002

**concerning the sixth framework programme of the European Atomic Energy Community (Euratom) for nuclear research and training activities, also contributing to the creation of the European Research Area (2002 to 2006)**

(2002/668/Euratom)

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular Article 7 thereof,

Having regard to the proposal from the Commission <sup>(1)</sup>,

Having regard to the opinion of the European Parliament <sup>(2)</sup>,

Having regard to the opinion of the Economic and Social Committee <sup>(3)</sup>,

Whereas:

- (1) A framework programme covering all research activities, including demonstration and training activities in the field of nuclear energy, to be implemented by means of research and training programmes, may be adopted pursuant to Article 7 of the Treaty.
- (2) In 2000 the Commission submitted two communications, respectively on the prospects for and the objectives of creating a European Research Area, and on making a reality of the European Research Area and guidelines for European Union research activities in the period 2002 to 2006. In 2000 the Commission also submitted a communication on innovation in a knowledge-driven economy.
- (3) The European Councils in Lisbon in March 2000, Santa Maria de Feira in June 2000 and Stockholm in March 2001 adopted conclusions aimed at the rapid establishment of a European research and innovation

area with a view to sustainable economic growth, more employment and social cohesion. The Göteborg European Council in June 2001 agreed a strategy for sustainable development and added a third, environmental dimension to the Lisbon strategy.

- (4) The European Parliament <sup>(4)</sup> <sup>(5)</sup>, the Council <sup>(6)</sup> <sup>(7)</sup>, the Economic and Social Committee <sup>(8)</sup> and the Committee of the Regions <sup>(9)</sup> have also supported the establishment of the European Research Area.
- (5) On 19 October 2000 the Commission submitted the conclusions of an external assessment of the implementation and results of the Community activities carried out in the five years preceding that assessment, accompanied by its observations.
- (6) It is therefore important to adopt a new framework programme for the period 2002 to 2006, also contributing to the establishment of the European Research Area and encouraging innovation.
- (7) The sixth framework programme sets out the scientific and technological objectives and priorities of the activities envisaged and indicates the broad lines of those activities which will be implemented in compliance with the objective of protecting the Community's financial interest. It is important to ensure sound financial management of the sixth framework programme.

<sup>(1)</sup> OJ C 180 E, 26.6.2001, p. 177.

<sup>(2)</sup> OJ C 140 E, 13.6.2002, p. 371.

<sup>(3)</sup> OJ C 260, 17.9.2001, p. 3.

<sup>(4)</sup> Resolution of 18 May 2000 (OJ C 59, 23.2.2001, p. 250).

<sup>(5)</sup> Resolution of 15 February 2001 (C 276, 1. 10. 2001, p. 271).

<sup>(6)</sup> Resolution of 15 June 2000 (OJ C 205, 19.7.2000, p. 1).

<sup>(7)</sup> Resolution of 16 November 2000 (OJ C 374, 28.12.2000, p. 1).

<sup>(8)</sup> Opinion of 24 May 2000 (OJ C 204, 18.7.2000, p. 70).

<sup>(9)</sup> Opinion of 12 April 2000 (OJ C 226, 8.8.2000, p. 18).

- (8) A financial reference amount within the meaning of point 34 of the Interinstitutional Agreement of 6 May 1999 between the European Parliament, the Council and the Commission on budgetary discipline and improvement of the budgetary procedure <sup>(1)</sup> is included in this Decision for the entire duration of the framework programme, without thereby affecting the powers of the budgetary authority as they are defined in the Treaty.
- (9) The Joint Research Centre should contribute to the implementation of the framework programme where it can provide independent, customer-driven support for the formulation and implementation of Community policies, including the monitoring of the implementation of such policies, in the areas of its specific competence.
- (10) Research activities carried out within the sixth framework programme should respect fundamental ethical principles, including those reflected in Article 6 of the Treaty on European Union and in the Charter of Fundamental Rights of the European Union, as well as the need to take into account public acceptability of these activities.
- (11) Following the Commission communication 'Women and science', and the Resolutions of the Council of 20 May 1999 <sup>(2)</sup> and 26 June 2001 <sup>(3)</sup> and the Resolution of the European Parliament of 3 February 2000 <sup>(4)</sup> on this theme, an action plan is being implemented in order to boost and increase the place and role of women in science and research in Europe, which should ensure the respect of equality of opportunity, irrespective of gender.
- (12) The Commission Green Paper 'Towards a European strategy for energy supply security' constitutes an element in the debate on the means of combating climate change and reducing Europe's dependence on imported energy.
- (13) It is appropriate that the Commission should submit regular progress reports to the European Parliament and the Council on the implementation of the sixth framework programme and that it should have an independent assessment carried out concerning the implementation of the activities in good time and before submitting its proposal for the next framework programme. Such assessment should be carried out in a spirit of openness with respect to all the relevant actors.
- (14) The international and global dimension in European research activities is important in the interest of obtaining mutual benefits. The sixth framework programme is open to the participation of countries having concluded the necessary agreements to this effect, and is also open on the project level and on the basis of mutual benefit, to the participation of entities from third countries and of international organisations for scientific cooperation.
- (15) The sixth framework programme should contribute to enlargement by bringing scientific and technological support to the candidate countries for the implementation of Community *acquis* and for their integration into the European Research Area. Information on the opportunities for participating in the programme should be provided to potential participants in a timely and thorough manner.
- (16) The Scientific and Technical Committee has been consulted by the Commission and has delivered its opinion,

HAS DECIDED AS FOLLOWS:

#### Article 1

1. A multi-annual framework programme for nuclear research and training activities, hereinafter referred to as the 'sixth framework programme', is hereby adopted for the period 2002 to 2006.
2. The sixth framework programme shall comprise Community research, technological development, international cooperation, dissemination and exploitation activities as well as training under the following headings:
  - controlled thermonuclear fusion,
  - management of radioactive waste,
  - radiation protection,
  - other activities in the field of nuclear technologies and safety,
  - nuclear activities of the Joint Research Centre.
3. Annex I sets out the scientific and technological objectives and the related priorities and indicates the broad lines of the activities envisaged.

#### Article 2

1. The financial reference amount for the implementation of the sixth framework programme for the period 2002 to 2006 shall be EUR 1 230 million. The proportion assigned to each of the activities is fixed in Annex II.

<sup>(1)</sup> OJ C 172, 18.6.1999, p. 1.

<sup>(2)</sup> OJ C 201, 16.7.1999, p. 1.

<sup>(3)</sup> OJ C 199, 14.7.2001, p. 1.

<sup>(4)</sup> OJ C 309, 27.10.2000, p. 57.

2. The detailed rules for financial participation by the Community shall be governed by the Financial Regulation applicable to the General Budget of the European Communities, supplemented by Annex III, and, where appropriate, by the research and training programme(s) which the Council will adopt in order to implement this Decision.

#### *Article 3*

All research activities carried out under the sixth framework programme shall be carried out in compliance with fundamental ethical principles.

#### *Article 4*

The sixth framework programme shall be implemented through research and training programmes. These programmes shall establish precise objectives and detailed rules for implementation.

#### *Article 5*

1. The Commission shall continually and systematically monitor, with the help of independent qualified experts, the implementation of the sixth framework programme and its research and training programmes.

2. Progress with implementing the sixth framework programme, and in particular progress towards achieving its objectives and meeting its priorities, including its financial aspects, shall be presented in detail in the report to be submitted by the Commission each year pursuant to Article 7 of the Treaty.

#### *Article 6*

Before submitting its proposal for the next framework programme, the Commission shall have an external assessment carried out by independent, highly qualified experts of the implementation and achievements of Community activities during the five years preceding that assessment.

The Commission shall communicate the conclusions thereof, accompanied by its observations, to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions.

Done at Luxembourg, 3 June 2002.

*For the Council*

J. C. APARICIO PÉREZ

*The President*

## ANNEX I

**SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES, BROAD LINES OF ACTIVITIES AND PRIORITIES**

In order to fulfil the objectives concerning nuclear research and training activities as set out in the Euratom Treaty, and in order to contribute to the establishment of the European Research Area, the sixth framework programme (Euratom), hereafter referred to as 'this programme', will be structured as outlined below.

Participation in this programme as a whole shall be open to all countries having concluded association agreements with the Community to this effect. Other third countries may participate in this programme via bilateral cooperation agreements. Researchers and organisations from third countries may also participate on a case by case basis in projects.

**1. PRIORITY THEMATIC AREAS OF RESEARCH****1.1. Controlled thermonuclear fusion**

Controlled thermonuclear fusion could contribute to long-term energy supply and, therefore, to the requirements of sustainable development for a reliable centralised supply of baseload electricity.

For reasons bound up with the complexity of fundamental knowledge in physics and the technological problems to be resolved, the developments needed for the possible application of fusion for energy production will necessarily take the form of a process in several steps, each of which has an impact on the next one. However, in a more immediate time frame, research into fusion technologies could give rise to useful technological spin-offs.

The efforts deployed in the context of the integrated European research programme on controlled thermonuclear fusion have enabled Europe to become a world leader in the field of research into fusion by magnetic confinement.

The progress made on the research and the results obtained, in particular with the European JET Tokamak, now make it possible to consider moving on to the 'Next Step', which would produce a machine capable of generating fusion reactions in conditions comparable to that of an energy production reactor.

The completion of the preparatory work on the detailed design of the 'Next Step' in the context of the ITER international cooperation project makes it possible to take a decision about the launching of this project and the construction of the machine.

The objective of this will be to demonstrate the scientific and technological feasibility of fusion energy production, bearing in mind the socio-economic aspects. The precise arrangements for implementing the project will depend on the outcome of the negotiations at present under way in the framework of international cooperation and subsequent developments, more particularly the decisions taken concerning Europe's contribution to the ITER project and the site where the machine is to be installed. An appropriate legal framework will need to be established.

Participation in the ITER initiative requires the implementation of an accompanying programme including the following elements:

- operation of the JET machine in such a way as to derive benefit from the improvements currently being made. Possible participation in the research activities needed for the decommissioning of fusion facilities,
- the continuation of research into fusion physics and technology, including: study and evaluation of magnetic confinement formulas, with, in particular, the continuation of the construction of the Wendelstein 7-X 'stellarator' and operation of the existing installations in the Euratom associations; coordinated activities regarding technological research, in particular research into materials for fusion.

**1.2. Management of radioactive waste**

Nuclear fission energy today supplies 35 % of electricity in the Community. It constitutes an element in the debate on the means of combating climate change and reducing Europe's dependence on imported energy. Some of the power plants of the current generation will continue to be operated for at least 20 years.

For these reasons, the exploitation of nuclear fission energy for energy production requires progress to be made in the problem of waste, and more particularly the industrial implementation of technical solutions for the management of long-lived waste.

European public and private sector research efforts with regard to nuclear waste treatment and storage technologies are significant. Through its coordination effects, Community action in this area makes it possible to assemble them into a critical mass and ensure the coherence of the guidelines adopted by the waste management organisations and industries concerned.

Actions will cover both the problem of waste management and the question of reducing its impact. In this connection, they will address the following aspects:

- research into processes for long-term storage in deep geological strata, with the networking of the activities carried out on various sites in the three main types of geological formations envisaged,
- research aimed at reducing the impact of waste, in particular through the development of new technologies to reduce the hazards associated with waste by means of partitioning and transmutation techniques, as well as exploring the potential of concepts to produce less waste in nuclear energy generation.

### 1.3. Radiation protection

Vigilance is still required to ensure a continuation of the Community's outstanding safety record. The enlargement of the Union also introduces new challenges. The improvement of radiation protection continues to be a priority area. In this programme these activities will be carried out mainly in the following areas:

- the quantification of the risks associated with low levels of exposure,
- medical exposure and exposure to natural sources,
- radio-ecology,
- risk and emergency management,
- protection of the workplace and the environment.

## 2. OTHER ACTIVITIES IN THE FIELD OF NUCLEAR TECHNOLOGIES AND SAFETY

The activities carried out under this heading are intended to:

- respond to the scientific and technical needs of the policies of the Community in the fields of health, energy and the environment,
- ensure that the European capability is maintained at a high level in relevant fields not covered by priority thematic areas,
- contribute towards the creation of the European Research Area.

These activities will be carried out mainly in the following areas:

- innovative concepts: evaluation of the potential of innovative concepts that offer advantages in terms of safety, environmental impact, resource utilisation, proliferation resistance; development of improved and safer processes in the field of nuclear energy,
- education and training concerning nuclear safety and radiation protection aimed at integration and consolidation of national efforts to achieve economy of scale, and covering in addition such areas as mobility and human resources, transnational access to infrastructure, and coordination activities,
- measures for the safety of existing nuclear installations.

### 3. NUCLEAR ACTIVITIES OF THE JOINT RESEARCH CENTRE (JRC)

The JRC's activities will aim to support related Community policies and specific Treaty obligations. Focussing its activities in areas where Community involvement is appropriate, the JRC operates where its European identity provides added value and where its action is justified by the cross-border aspects of nuclear safety and security or by public concern. The principal objective will be to further develop collaboration through networking, leading to broad consensus on a range of these issues at a European and world level. Special attention will be given to cooperation with candidate countries. Training activities will be an important component for the JRC to help equip the Community with a future generation of scientists with the necessary competencies and expertise. The main areas of research activity will therefore be as follows <sup>(1)</sup>:

#### 3.1. Nuclear safety and security

Research into waste treatment and storage (in particular separation and transmutation techniques for long-lived actinides) and radiation protection; safety of different types of reactors with priority for reactors in the candidate countries, and the development of control methods with regard to fissile materials, as well as technical support for nuclear non-proliferation. Staff for monitoring the decommissioning of obsolete nuclear installations will be provided.

#### 3.2. Measurements and reference materials

Radionuclide metrology, in particular in the case of low activity and round robin tests in the framework of networks of laboratories of excellence; interaction between neutrons and matter for the generation of base data for studies concerning the transmutation of waste and the development of new systems. This activity will principally provide horizontal support for actions under title 3.1 above.

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<sup>(1)</sup> In addition, the JRC is entitled to participate in all research activities on the same basis as entities established in Member States.



## ANNEX II

**MAXIMUM OVERALL AMOUNT, RESPECTIVE SHARES AND INDICATIVE BREAKDOWN***(EUR million)*

1. Priority thematic areas of research		890
1.1. Controlled thermonuclear fusion	750	
1.2. Management of radioactive waste	90	
1.3. Radiation protection	50	
2. Other activities in the field of nuclear technologies and safety		50
3. Nuclear activities of the Joint Research Centre (JRC)		290
Total		1 230

## ANNEX III

## INSTRUMENTS

**Introduction**

The Community's budgetary intervention in indirect actions (i.e. those not undertaken by the JRC) is aimed at research centres, universities, businesses and national or international bodies situated in the Member States and the European associated states which carry out research activities. The latter may also act as intermediaries for Community budgetary intervention. Where this proves necessary to achieve the objectives of the programme, bodies in the newly independent states (NIS) and international organisations may exceptionally receive Community funding.

**1. INSTRUMENTS IN FUSION ENERGY**

In the field of fusion energy research under Heading 1.1 of Annex I, the particular nature of the activities in this area necessitates the implementation of specific arrangements. The projects undertaken will be carried out on the basis of procedures set out in:

- contracts of association,
- the European Fusion Development Agreement (EFDA),
- any other multilateral agreement concluded between the Community and associated organisations and/or legal entities which may be set up, after the competent consultative committee has given its opinion,
- other contracts of limited duration, in particular with bodies in the Member States or the States associated with the Euratom framework programme,
- international agreements covering projects carried out in the framework of cooperation with third countries, such as the ITER.

The activities to coordinate and support fusion energy research may concern studies in support of these activities, support for information exchange, recourse to external expertise capacities, including for the independent evaluation of activities, fellowships and training schemes, publications and other actions to promote technology transfer.

**2. INSTRUMENTS IN OTHER FIELDS**

In the fields of management of radioactive waste and radiation protection of the priority thematic areas of research under Headings 1.2 and 1.3 of Annex I as well in other activities under Heading 2, the Community, subject to the specific programmes and rules for participation, will contribute:

- to networks of excellence, aimed at strengthening and developing Community scientific and technological excellence by means of the integration, at European level, of research capacities currently existing or emerging at both national and regional level,
- to integrated projects, designed to give increased impetus to the Community's competitiveness or to address major societal needs by mobilising a critical mass of research and technological development resources and competences,
- specific targeted projects, designed to gain new knowledge either to improve considerably or to develop new products, processes or services or to meet other needs of society and Community policies or to demonstrate the viability of new technologies offering potential economic advantage but which cannot be commercialised directly,
- actions to promote and develop human resources and mobility,
- coordination actions, intended to promote and support coordinated initiatives of a range of research and innovation operators aiming at improved integration,

- specific support actions, such as actions aimed at exploiting the results of research and transfer of knowledge and actions in support of research infrastructure relating to, for instance, transnational access or preparatory technical work (including feasibility studies),
- integrated infrastructure initiatives, combining in a single action several activities essential to reinforce and develop research infrastructures in order to provide services at the European level.

### 3. DIRECT ACTIONS — JOINT RESEARCH CENTRE

Direct actions will be implemented by the JRC.

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